

REMARKS

Claims 1-7 are pending in the application. No new matter has been presented.

Rejections under 35 USC §103(a)

Claims 1, 2, 4 and 7 were rejected under 35 U.S.C. 103(a) as being obvious over KISHI et al. (U.S. Patent No. 5,824,561) in view of CHIU et al. (U.S. Patent No. 5,987,890).

Claim 1 recites, among other things, “electric conductor directly connecting the first electrode and the second electrode making the first electrode and the second electrode electrically short-circuited.”

The Examiner alleged as follows:

Regarding claim 1, KISHI discloses a cooling device comprising:
a first electrode (156-a, Figure 15; Col. 27, lines 4-10);
a second electrode (156-b, Figure 15; Col. 27, lines 4-10);
a thermoelectric conversion material disposed between the first and second electrode (153 and 154, Figure 15; Col. 26, line 65 - Col. 27, line 4);
and

an electric conductor directly connecting the first and second electrode making the first and second electrodes electrically short-circuited (Col. 27, lines 10-17).

KISHI additionally teaches the device cooling an aluminum radiating plate adhered to the heat generating side (Col. 12, lines 45-56).

(Office Action, page 3, lines 1-10). However, 156-a in KISHI is not the first electrode. Also, 156-b in KISHI is not the second electrode. These will be clearly understood from the structure of the device disclosed in KISHI. Specifically, KISHI et al. describes the conventional device as follows:

FIG. 16 illustrates views showing an arrangement of electrodes of substrates and thermoelectric material chips at 40 a section cut in a direction in parallel with the substrates and respective sections in a direction orthogonal to the substrates of a conventional thermoelectric device (hereinafter called a thermoelectric device including a module in which the above-mentioned

plurality of thermoelectric chips are 45 arranged) having such a structure. FIG. 16A is a view showing an arrangement of electrodes and thermoelectric material chips on the substrate at a section in parallel with the substrates of the conventional thermoelectric device. In other words, it is a perspective view for indicating the 50 arrangement of the electrodes and the thermoelectric material chips from above the substrate. An electrode pattern shown by bold lines indicates an electrode 161 of a top substrate whereas an electrode pattern shown by dotted lines indicates an electrode 162 of a bottom substrate.

(KISHI et al., col. 1, line 39-55). The structure of thermoelectric device shown in Fig. 15 is based on the structure shown in Figs. 1 and 2. KISHI et al. describes as follows:

FIG. 1 is a view showing appearance of a thermoelectric device according to the present invention. The basic structure of a thermoelectric device 11 shown in FIG. 1 comprises substrates 12, P-type thermoelectric material chips 13, N-type thermoelectric material chips 14 and electrodes 15 for PN junction. FIG. 2A and FIG. 2B are views showing sections of major portions taken along lines A-A' and B-B' of FIG. 1 showing appearance of the thermoelectric device, respectively.

In the sectional views of FIG. 2, in addition to the major portions of the thermoelectric device, structures 23 of the present invention are formed on the substrates 21 at the surroundings of bonding portions. In FIG. 2A that is a sectional view taken along the line A-A' of FIG. 1, the P-type thermoelectric material chips and the N-type thermoelectric material chips are arranged alternately whereas in FIG. 2B that is a sectional view taken along the line B-B' of FIG. 1, only P-type thermoelectric material chips or N-type thermoelectric material chips are arranged.

(KISHI et al., col. 8, line 51-col. 9, line 2).

Regarding the electrode 156-a and the electrode 156-b, KISHI et al. describes as follows:

Electrodes 156 are provided at the outer periphery of the wiring on the bottom substrate as device repair and inspection electrodes for the present invention. The existence of defects such as disconnections existing between the electrodes 156 (for example, between the electrodes 156-a and 156-b in FIG. 15) can be investigated by providing a number of electrodes 156 and by connecting with inspection probe electrodes between the electrodes. Also, **if a defect exists between the electrodes 156, the defective part can be electrically isolated by making electrical connections between the electrodes and a device can be formed just using non-defective parts. For example, if there is a disconnection at the point A in FIG. 15, the device can be made to function by electrically making a short-circuit between the electrode 156-a and the electrode 156-b.**

(KISHI et al., column 27, lines 4-16). Thus, according to KISHI et al., the electrode 156-a and the electrode 156-b are connected to make a short-circuit between these electrodes. KISHI et al. explains about Fig. 15 before the above cited portion as follows:

FIG. 15 is a view showing only a metal wiring part of a thermoelectric device produced by sandwiching between two alumina substrates a PN junction comprising a P-type thermoelectric material and an N-type thermoelectric material connected through a metal, with **the view being taken from above one of the substrates**.

In FIG. 15, solid line parts 1 show an electrode pattern for the PN junctions provided on the top substrate and dashed lines 152 show electrode patterns for the PN junction provided on the bottom substrate. The P-type thermoelectric materials chips 153 and the N-type thermoelectric materials chips 154 mutually disposed at the parts where these continuous lines and dashed lines cross and are linked in series between two input/output electrodes 155 (hereinafter, between two electrodes will be referred to as between electrodes).

(KISHI et al., column 26, line 56 to column 27, line 4). Thus, electrode 156-a and electrode 156-b connected to make a short-circuit are on the same substrate, i.e., on the same electrode, provided at the outer periphery of the wiring on the bottom substrate either the first electrode or the second electrode for PN junction. Therefore, the short circuit between electrode 156-a and electrode 156-b neither **directly connects the first electrode and the second electrode** nor makes the first electrode and the second electrode electrically short-circuited.

Thus, despite the Examiner's allegation, KISHI et al. does not teach or suggest, among other things, "electric conductor directly connecting the first electrode and the second electrode making the first electrode and the second electrode electrically short-circuited," as recited in claim 1.

CHIU et al. was cited for allegedly disclosing that the cooling device is in contact with the electronic component to be cooled. Such disclosure of CHIU et al. does not remedy the deficiencies of KISHI et al.

For at least these reasons, claim 1 patentably distinguishes over KISHI et al. and CHIU et al. Claims 2, 4 and 7, depending from claim 1 also claim 1 patentably distinguish over KISHI et al. and CHIU et al. for at least the same reasons.

Claim 3 was rejected under 35 U.S.C. 103(a) as being obvious over KISHI et al. (U.S. Patent No. 5,824,561) in view of CHIU et al. (U.S. Patent No. 5,987,890) as applied to claims 1, 2, 4 and 7, above, and in further view of MURAMATSU et al. (U.S. Patent No. 6,326,610 B1).

Claim 3, depending from claim 1 also claim 1 patentably distinguish over KISHI et al. and CHIU et al. for at least the same reasons. MURAMATSU et al. is cited for allegedly disclosing Peltier devices for cooling which is stacking two cooling devices. However, such disclosure of MURAMATSU et al. does not remedy the deficiencies of KISHI et al. and CHIU et al.

For at least these reasons, claim 3 patentably distinguishes over KISHI et al., CHIU et al. and MURAMATSU et al.

Claims 5 and 6 were rejected under 35 U.S.C. 103(a) as being obvious over KISHI et al. (U.S. Patent No. 5,824,561) in view of CHIU et al. (U.S. Patent No. 5,987,890) as applied to claims 1, 2, 4 and 7 above, and in further view of BENSON et al. (U.S. Patent No. 4,650,919).

Claims 5 and 6, depending from claim 1, also claim 1 patentably distinguish over KISHI et al. and CHIU et al. for at least the same reasons. BENSON et al. is cited for allegedly disclosing a thermoelectric device the thermoelectric material of which can be of n-type only or p-type only. However, such disclosure of BENSON et al. does not remedy the deficiencies of KISHI et al. and CHIU et al.

For at least these reasons, claim 5 and 6 patentably distinguish over KISHI et al., CHIU et al. and BENSON et al.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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